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# Standardized packaging and illicit tobacco use: A systematic review

Catherine Haighton<sup>1, 2</sup>, Catherine Taylor<sup>3</sup>, Ailsa Rutter<sup>3</sup>

## ABSTRACT

**INTRODUCTION** To systematically review the evidence regarding the effect of standardized packaging on illicit tobacco use.

**METHODS** Data sources were EMBASE, Web of Knowledge, Scopus, PsycInfo, Medline, and the British Library catalogue, from 01/01/1987 to 28/11/2016. Reference lists of included studies were hand searched for additional papers. Search strategies were based on the terms ‘tobacco’, ‘packaging’ and ‘illicit’. The search was restricted to English language references. Two reviewers screened titles and abstracts for empirical studies that addressed the topic of standardized packaging and illicit tobacco use. This resulted in 153 full text papers retrieved for screening. Following exclusions, ten papers were included in the review. Two reviewers’ extracted data using piloted standardized data extraction forms. Studies were assessed for quality and relevance using CASP.

**RESULTS** There was little homogeneity between included studies, so a narrative synthesis was employed. Of the relevant studies five reported smokers did not intend to or actually purchase further illicit tobacco following standardized packaging, although one suggested a small number of responders to online news felt smokers would be more inclined to purchase illicit tobacco, following standardized packaging. Two studies reported retailers did not intend to or actually increase sales of illicit tobacco following standardized packaging. Finally, two studies reported industry data on illicit tobacco were of poor quality and not supported by independent data.

**CONCLUSIONS** There were few studies examining tobacco standardized packaging and illicit trade, however those available showed no evidence that standardized packaging could lead to increases in illicit trade.

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## INTRODUCTION

The negative consequences of tobacco use are already well established<sup>1</sup> and most tobacco use is through smoking<sup>2</sup>. Therefore, there is a global ambition to reduce the rates of tobacco smoking and the associated consequences by making smoking less acceptable, less accessible and less affordable<sup>3, 4</sup>. Success in the decline in smoking rates lies in the delivery of evidence-based comprehensive tobacco control, delivered in line with the World Health Organisation (WHO) Framework Convention on Tobacco Control (FCTC)<sup>4</sup>. Guidelines for the FCTC recommend that parties “consider adopting measures to restrict or prohibit the use of logos, colours, brand images or promotional information on packaging other than brand names and product names displayed in a standard colour and font style”<sup>5</sup>. Put simply, these measures taken together represent the introduction of standardized tobacco packaging, sometimes referred to as generic or plain packaging.

Tobacco packaging is an important marketing tool used by the tobacco industry<sup>6</sup>. Decades of tobacco control legislation have restricted the ability of tobacco companies to advertise their products, the result being the use, by tobacco companies, of the tobacco pack as a means of communicating with current, future and former users of tobacco<sup>7</sup>. This method of advertising has led some commentators to suggest that the pack has in fact become a “silent salesman”<sup>8</sup>. Indeed, publication of the internal documents of tobacco companies has revealed the importance placed on the pack given the tight regulations on advertising, with one marketing executive wanting to ensure that his company’s brand “would shout out to customers from the shelves”<sup>9</sup>.

Standardised tobacco packaging has the potential to make tobacco products less attractive, especially to young people, to strengthen the impact of health warnings, and to make the pack less misleading about whether one variant of a tobacco brand

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is more or less harmful than another<sup>10</sup>. Australia became the first country in the world to introduce standardized packaging when legislation was implemented on 1st December 2012<sup>11</sup>. Standardized packaging has been implemented in Australia, the UK and France, has been adopted in Ireland and is under formal consideration in Norway, Hungary, Slovenia, Sweden, Finland, Canada, New Zealand, Singapore, Belgium, and South Africa. In the UK, the government held a national consultation seeking feedback on whether requiring tobacco products to be sold in standardized packaging could contribute to achieving public health policy objectives<sup>12</sup>. The consultation took place across England, Wales, Scotland and Northern Ireland between 16th April and 10th August 2012 requesting feedback from respondents on what other effects there may be if the measure was introduced.

Opponents of standardized tobacco packaging, including the four largest trans-national tobacco companies (TTCs) – Philip Morris International (PMI), Japan Tobacco International (JTI), Imperial Tobacco (IT) and British American Tobacco (BAT) – argued that the measure would lead to an increase in the illicit tobacco trade<sup>13–16</sup>. One of the questions in the UK consultation document addressed the specific issue of standardised packaging and illicit tobacco: *“Do you believe that requiring standardised tobacco packaging would increase the supply of, or demand for, illicit tobacco in the United Kingdom?”* (Page 14)<sup>12</sup>.

Illicit tobacco is the term generally used to describe that which is available on the illicit market: smuggled (genuine products smuggled from abroad); counterfeit (fake products appearing to be a genuine brand); and illicit whites (legitimately manufactured brands intentionally sold on the illegal market). Illicit tobacco is a public health concern for three key reasons; price, availability and accessibility<sup>17</sup>. Illicit tobacco is also a concern for those tasked with enforcing tobacco legislation, given that it leads to tax evasion, is often linked to organised crime, the smuggling of other commodities, is sold to under-18s and is incorrectly labelled<sup>18</sup>.

The claim that the introduction of standardized tobacco packaging will lead to an increase in the trade in illicit tobacco is said by the tobacco industry to be one of *“the main uncertainties associated with the policy ... (beyond the impact on smoking behaviour itself)”* (page 4)<sup>13</sup>. This claim is perhaps its most influential, receiving significant interest from the media and decision-makers. These arguments are made strongly in their responses to the specific question in the consultation about the potential impact of standardized packaging on the supply of, or demand for, illicit tobacco in the UK.

The size of the illicit tobacco market in the UK has been in long-term decline since 2000<sup>19</sup>. HM Revenue & Customs figures

show the proportion of illicit cigarettes sold in the UK fell from 21% in 2000/01 to 11% in 2009/10. The figures for hand rolled tobacco fell from 63% in 2000/01 to 42% in 2009/10<sup>19</sup>. However, the TTCs portray a different picture. Despite the publication of HM Revenue & Customs statistics in the consultation document, each of the companies present a variation on the 2009/10 data in their consultation responses, either through using their own methods of calculation or by applying a different interpretation to the HM Revenue & Customs figures (e.g. Imperial Tobacco reports 17% and 53%, respectively). TTCs have also drawn on their own industry expertise, for example discredited empty pack surveys<sup>20</sup>, for which no methodology is available but which are likely to involve the collection of discarded cigarette packets and determining whether they were bought legally or illegally. These surveys have a number of limitations, most notably that they can only measure non-domestic products, which includes legal and illegal products and it is therefore not possible to distinguish between legal (legal cross-border and duty-free shopping and products brought in by tourists) and illegal non-domestic products. Furthermore, they are often only undertaken in the largest cities and at sports events where illicit and non-domestic tobacco is likely to be more prevalent. From these empty-pack surveys and a number of reports commissioned by the TTCs to develop their responses to the consultation in relation to illicit tobacco, two primary themes become apparent; standardized tobacco packaging will be easier to counterfeit and illicit tobacco products will be more cheaply available. The TTCs have proposed that, as a result of these two predictions: the structure of the tobacco market will change; legitimate business will be harmed; levels of criminality will increase; and accessibility of tobacco products would be easier. For example, the tobacco industry has claimed that over 16% of all cigarettes sold in Sydney were illicit and that the sale of illicit “white” cigarettes, not legally sold in any market, had sharply increased since the introduction of standardized packaging legislation<sup>21</sup>.

A number of reviews<sup>10, 22–26</sup> have recently outlined the evidence in favour of introducing standardized tobacco packaging as a potentially effective measure in reducing smoking prevalence based on proxy indicators, such as reducing appeal and increasing salience of health warnings. Although the effect of standardized packaging on illicit tobacco featured in the 2014 independent review undertaken by Sir Cyril Chantler for the UK Secretary of State for Health<sup>23</sup>, none of these reviews systematically reviewed the available evidence on the impact of standardized packaging on illicit tobacco. The aim of this study therefore was to systematically review the empirical evidence regarding the effect of standardized packaging on illicit tobacco use.

METHODS

Data sources

We searched six databases of peer-reviewed literature (EMBASE, Web of Knowledge, Scopus, PsycInfo, Medline and the British Library catalogue) using a search strategy (see supplementary file) based on the terms ‘tobacco’, ‘packaging’ and ‘illicit’ and then adapted it to suit individual databases using Boolean operators. Reference lists of included studies were hand searched for additional papers. Data sources were searched for English language references from the period 1st January 1987 (when it is generally accepted that the first study into standardized packaging was conducted<sup>27</sup>) to 28th November 2016. After eliminating duplicates, this search produced 902 papers.

Study selection

Two authors (CAH and CMT) shared screening of titles and abstracts (where available) for empirical studies that addressed the topic of standardized packaging and illicit tobacco. A 10% random sample of titles and abstracts was screened by both authors at the outset to check for consistency, with any disagreements resolved by consensus or third party adjudication.

Empirical studies were defined as those based on observed and measured phenomena and which derived knowledge from actual experience rather than from theory or belief. No restriction was placed on empirical study design. Papers were excluded if they focussed only on illegal sales in relation to underage sales (as opposed to sales of illicit tobacco) or packaging in relation to health warnings and product labelling. See Table 1 for detailed inclusion/exclusion criteria. This resulted in 153 full text papers being retrieved for screening against the inclusion criteria. Following exclusions, ten papers were included in the review (See Figure 1).

Data extraction

Data extraction was shared between two of the authors (CAH and CMT) using piloted standardized data extraction forms for consistency, control of bias, validity and reliability<sup>29</sup>. A 10% random sample of included papers (corresponding to one complete study<sup>30</sup>) was extracted by both authors at the outset to check for consistency with any disagreements resolved by consensus or third party adjudication. A standardized data extraction form was developed by CMT and then piloted on an

Figure 1: Process of identifying references for inclusion in systematic review<sup>28</sup>

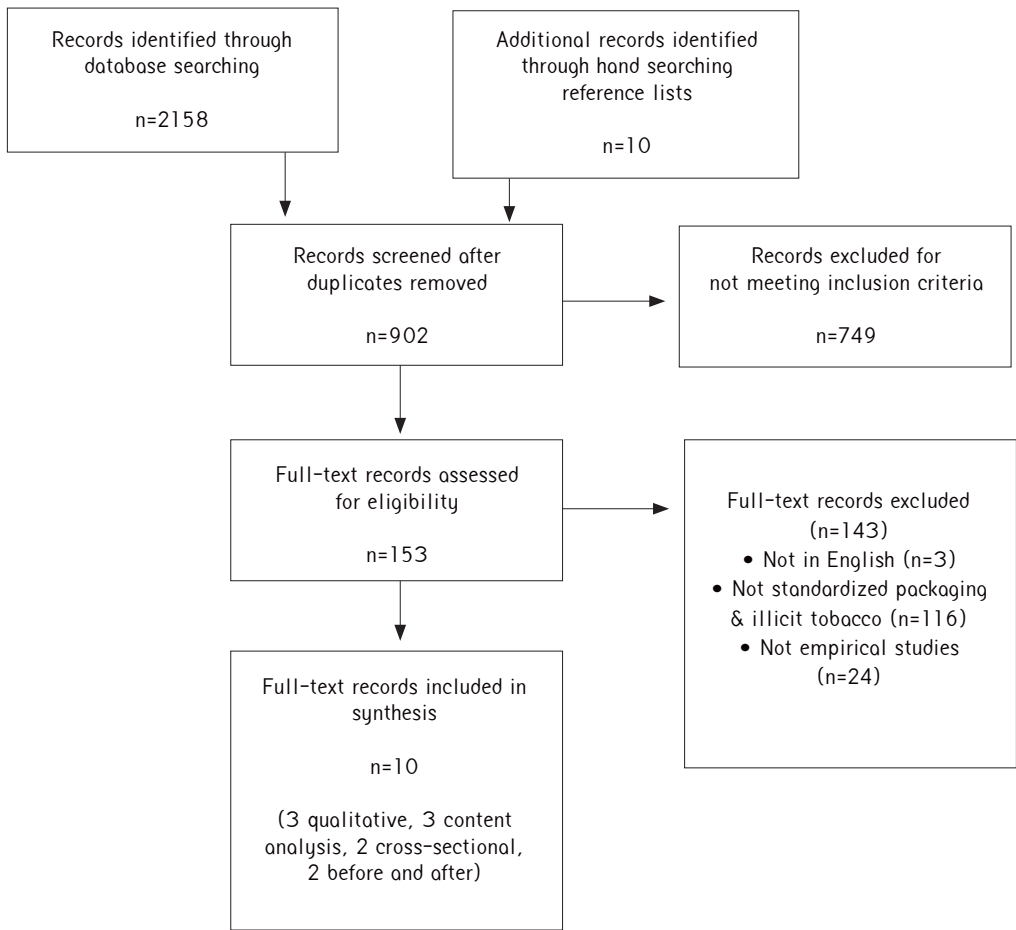


Table 1 Inclusion/exclusion criteria

Inclusion criteria	Exclusion criteria
Empirical peer reviewed studies published between 01/01/87 & 28/10/16	Studies examining packaging in relation to health warnings and product labelling
Studies examining tobacco standardized packaging and illicit trade	Studies examining illegal tobacco sales in relation to underage sales.
Any study design	Non-English language
	Non-empirical papers, e.g. editorial or opinion articles

included study. As a result some redundant fields were removed and others included and expanded upon. The data extracted included study aims and design, the sample studied, sampling strategy, recruitment and consent process, data collection and analysis and findings. Each study was also assessed for quality and relevance using the most appropriate critical appraisal tool from the Critical Appraisal Skills Programme (CASP)<sup>31</sup>, depending on the study design. Quality was included as part of the data extraction process but was not used as a basis on which to exclude studies.

Synthesis

We were prevented from conducting a meta-analysis as there was little homogeneity between the included studies. The results of the papers are therefore presented through a narrative synthesis with studies grouped according to purchasing, retailing or industry behaviour.

RESULTS

Searches generated ten relevant empirical studies<sup>21,30,32-39</sup>: three were qualitative studies (two reporting focus group research with young adult smokers in Scotland<sup>30, 32</sup>, and in-depth interviews with retailers in New Zealand<sup>39</sup>); three were content analyses (of online commentary on tobacco packaging in Australia<sup>33</sup>, UK press coverage of the illicit tobacco trade<sup>34</sup> and the four TTC submissions to the consultation in the UK<sup>35</sup>); two were cross sectional surveys (of illicit tobacco use following introduction of standardized packaging in Australia)<sup>36, 37</sup>; and two were before and after studies (one of availability of illicit tobacco in small retail outlets<sup>38</sup> and one empty-pack survey before and after the introduction of standardized packaging in Australia)<sup>21</sup>. See Table 2 for a summary of included studies. A narrative synthesis is presented combining the main findings of included studies according to either intended or actual illicit tobacco purchasing or retailing behaviour as well as industry behaviour in response to standardized tobacco packaging. In addition, the quality of included studies is provided.

Purchasing behaviour (intended)

Three studies examined the potential impact of standardized packaging on intended illicit tobacco purchasing behaviour<sup>30, 32, 33</sup>. Two qualitative studies carried out in Glasgow in 2010<sup>30</sup> and 2012<sup>32</sup>, respectively, used focus groups to explore current smokers' illicit tobacco purchasing intention if standardized packaging was subsequently introduced. Moodie, Hastings and Joossens<sup>30</sup> used purposive sampling to recruit 54 adult smokers aged 18-35 years, as at the time, this age group contained more than half of all smokers in the UK and previous research had suggested that younger smokers were buying more illicit cigarettes than other age groups. The consensus among male participants, who were more likely to buy illicit tobacco, was that if all cigarettes came in the same colour packs, their illicit tobacco purchasing behaviour would not change. The main reason given for this was that illicit tobacco use was typically the result of the availability and the price of the product. Females similarly reported that standardized tobacco packaging would not change their use of illicit tobacco, or make them start buying it because of the packaging. Participants also reported that it was unlikely that they would purchase counterfeit cigarettes by mistake as they were generally easy to identify<sup>30</sup>.

Later Moodie, Purves, McKell and de Andrade<sup>32</sup> used purposive sampling to recruit 49 young women smokers aged 16-24 years old. This age group was selected because between 2004 and 2009 the rate of smoking among women this age increased while the popularity of smoking in women aged 20-24 years old remained similar to what it had been 25 years previously. Research had also revealed that the attractiveness of cigarette packaging was more influential to women this age than men of a similar age. Therefore removing the visual allure of packaging, through standardization, may have a greater impact on young women's opinions of illicit tobacco. Participants reported that, apart from reduced cost, there were few benefits to counterfeit tobacco. Again the decision to purchase counterfeit tobacco was usually based on price. Participants, who had bought counterfeit cigarettes before, believed them to be of a lower standard and less enjoyable than their usual legitimate brand, however they would consider purchasing counterfeit cigarettes if their finances dictated it. While cost was definitely a consideration, participants who had never purchased counterfeit cigarettes before reported that they would not switch to counterfeit products if this meant forgoing the positive attributes of their legitimate brand. In terms of the cigarette brand that participants would choose if standardized packaging was introduced, most participants reported that if all cigarette packaging (legitimate and counterfeit) were standardized they would continue to purchase their current brand. Participants who actively opposed the introduction of



Table 2: Included studies

Publication	Year	Country	Study design	Conclusion
Moodie, Hastings, Joossens. Young adult smokers' perceptions of illicit tobacco and the possible impact of plain packaging on purchase behaviour. <i>European Journal of Public Health</i> <sup>30</sup>	2011	Scotland, UK	Qualitative, 8 focus groups, 54 young adult smokers aged 18–35. Purposive sampling. Semi-structured approach	Packaging (branded or standardized) had no impact on the decision to consume counterfeit tobacco. Counterfeit was immediately recognisable not least by poor quality of packaging
Freeman. Tobacco plain packaging legislation: a content analysis of commentary posted on Australian online news <sup>33</sup>	2011	Australia	Content analysis of public commentary on online news items about standardized packaging restricted to Australian websites between 28th April and 8th May 2010	Standardized packaging can be exceptionally newsworthy and arouse strong public opinion. The comments unsupportive of standardized packaging were more than 2.5 times more common than those supportive of the policy
Moodie, Purves, McKell, de Andrade. Young women smokers' perceptions and use of counterfeit cigarettes: Would plain packaging make a difference? <i>Addiction Research &amp; Theory</i> <sup>32</sup>	2013	Scotland, UK	Qualitative, 8 focus groups, 49 young women smokers aged 16–24. Purposive sampling. Semi-structured approach	Standardized packaging had no bearing on perceived appeal of counterfeit cigarettes
Rowell, Evans-Reeves, Gilmore. Tobacco industry manipulation of data on and press coverage of the illicit tobacco trade in the UK. <i>Tobacco Control</i> <sup>34</sup>	2014	UK	Content analysis of UK press articles citing industry data on illicit tobacco from March 2008 to March 2013	TTCs were exaggerating the threat of illicit tobacco by commissioning surveys whose methodology and validity remain uncertain, planting misleading stories and misquoting government data. Industry data should be treated with caution
Scollo, Zacher, Durkin, Wakefield. Early evidence about the predicted unintended consequences of standardised packaging of tobacco products in Australia: a cross-sectional study of the place of purchase, regular brands and use of illicit tobacco. <i>BMJ Open</i> <sup>36</sup>	2014	Australia	Cross-sectional population telephone surveys in Nov 2011 (a year prior to implementation), 2012 (during roll out) and 2013 (a year after implementation) of smokers aged 18+	One year after implementation there was no evidence of the major unintended consequences concerning loss of smoker patrons from small retail outlets, flooding of the market by cheap Asian brands and use of illicit tobacco
Scollo, Bayley, Wakefield. Availability of illicit tobacco in small retail outlets before and after the implementation of Australian plain packaging legislation. <i>Tobacco Control</i> <sup>38</sup>	2015	Australia	Before and after study. Fieldworkers requested cheapest branded and unbranded cigarettes in small retail outlets before and after introduction of standardized packaging	No change in availability of illicit tobacco was observed following implementation of standardized packaging
Evans-Reeves, Hatchard, Gilmore. "It will harm business and increase illicit trade": an evaluation of the relevance, quality and transparency of evidence submitted by transnational tobacco companies to the UK consultation on standardised packaging 2012. <i>Tobacco Control</i> <sup>35</sup>	2015	UK	Content analysis of the four TTCs' submission to the UK consultation on standardized packaging	In the absence of peer-reviewed research to support their arguments, TTCs relied on evidence they commissioned and the opinions of TTC-connected third parties. Such connections were not disclosed by TTCs
Scollo, Zacher, Coomber, Wakefield. Use of illicit tobacco following introduction of standardised packaging of tobacco products in Australia: results from a national cross-sectional survey. <i>Tobacco Control</i> <sup>37</sup>	2015	Australia	National cross-sectional telephone surveys conducted continuously from April 2012 (6 months before implementation of standardized packaging) to March 2014 (15 months after) of adult smokers	No evidence in Australia of increased use of two categories of manufactured cigarettes likely to be contraband, no increase in purchase from informal sellers and no increased use of unbranded illicit tobacco
Peters, Saffron. Patterns of non-compliant tobacco use in Sydney estimated using an empty pack survey. <i>Respirology</i> <sup>21</sup>	2015	Australia	Before and after empty-pack survey	Illicit trade in unbranded cigarettes was minimal
Guthrie, Hoek, Darroch, Wood. A qualitative analysis of New Zealand retailers' responses to standardised packaging legislation and tobacco industry opposition <sup>39</sup>	2015	New Zealand	Qualitative, 23 in-depth interviews with retailers. Purposive sampling stratified by store type. Semi-structured approach	Few retailers thought standardized packaging would foster illicit trade or spawn further regulation. Most retailers placed public health goals ahead of tobacco companies "rights" and many supported government intervention to protect population health

standardized packaging also reported that they would continue to purchase their usual brand because they would know what was in the box, although some respondents reported that they would consider purchasing cheaper legitimate brands. Several young women reported that they would consider purchasing counterfeit cigarettes; however on being told that these brands

could not be purchased from shops, they reported that they would continue to purchase their current legitimate brand. Current users of counterfeit cigarettes confirmed that they would continue to purchase counterfeit cigarettes from time to time as a result of cost and convenience. However, users of counterfeit cigarettes said that, in general, they would continue

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to purchase their usual legitimate brand and if finances demanded they would purchase cheaper cigarettes (legal or counterfeit) regardless of packaging.

In contrast to these two qualitative studies, Freeman<sup>33</sup> conducted a content analysis of commentary posted on Australian online news articles that covered the topic of tobacco standardized packaging legislation in Australia after the measure was announced in 2010. The aim of the analysis was to examine how online readers reacted to standardized packaging, in order to understand how those opposed to policy reform framed their arguments thereby allowing; (a) anticipation of such arguments in countries where standardized packaging was being discussed and (b) the subsequent planning of communication strategies to counteract oppositional arguments that have the potential to gain political traction. Of 117 standardized packaging news items, 41 included 1818 reader comments. Of these 1187 (65.3%) comments contained no reference to standardized packaging and mainly addressed a tobacco tax rise announced at the same time. The comments about standardized packaging were more than 2.5 times more likely to oppose than support the policy. The dominant argument, comprising 27% (206) of oppositional comments was that standardized packaging would be ineffective in reducing smoking. However, the study also found 45 comments (5.9%) reporting that standardized packaging as a policy would fail as smokers would be more inclined to purchase counterfeit or smuggled branded packs. These arguments framed standardized packaging as pointless legislation as it would present loopholes to exploit by the tobacco industry and smokers.

In terms of quality, both qualitative studies presented for the first time, data which provided insight into young adult<sup>30</sup> and young women<sup>32</sup> smokers' perceptions of the potential impact of standardized packaging on intended illicit tobacco purchase behaviour. Both studies used relatively large samples for qualitative research; however it is unlikely that findings could be generalised to the wider population of older smokers. More research is needed to consider a broader age range of smokers as well as level of addiction. The reality was that standardized packs were not available in the UK and that socially desirable responding may have impacted on the responses from participants. A further limitation was the use of a visual prompt that did not accurately represent the appearance of standardized packaging, either as proposed in the UK or as used in Australia. In addition neither qualitative study provided detail with regard to how the data were analysed, whether data saturation was achieved or reported any method used to validate findings. However, Moodie, Purves, McKell and de Andrade<sup>32</sup> reported methods to minimise potential moderator and question order bias. While Freeman<sup>33</sup>

was first to systematically document and analyse the common opposition arguments to standardized tobacco packaging legislation in Australia in readers of online news, the time period searched was small (11 days) and the method by which data were collected (via online news articles) was weak. These limitations were exacerbated by a lack of knowledge about the people who regularly post comments on online news items. The views gathered were from self-selecting individuals who were unlikely to be representative of the Australian population. Further, it has been reported that negative emotions motivate people to express their opinions and the most active people who post online comments are those with negative views on events<sup>40</sup>. It was not clear within the published paper whether commentators were posting more than once<sup>33</sup>. However, Freeman<sup>33</sup> ensured that two researchers each coded the sample independently and a total of six researchers coded a random sample. Inter-coder reliability tests revealed a high level of reliability.

### Purchasing behaviour (actual)

Three studies examined the actual impact of standardized packaging on illicit tobacco purchasing behaviour following implementation of legislation in Australia<sup>21, 36, 37</sup>. Two studies used repeated<sup>36</sup> and continuous<sup>37</sup> cross-sectional population telephone surveys, respectively, to examine early evidence of whether Australian smokers were more likely to use illicit tobacco following the standardization of tobacco packaging. Scollo and colleagues<sup>36</sup> carried out a survey one year prior to implementation of the policy (November 2011), during roll-out (2012) and a year after implementation (2013). Participants were smokers aged 18 years and over, identified in an annual population survey in the Australian State of Victoria (2011: n=754; 2012: n=590; 2013: n=601). Results revealed the prevalence of low cost Asian brands was low and did not increase between 2011 (1.1%) and 2013 (0.9%) (adj OR=1.02, 95% CI 0.28 to 3.75, p=0.98). The proportion who reported use of unbranded, i.e. illicit tobacco, was 2.3% in 2011 and 1.9% in 2013 (adj OR=0.69, 95% CI 0.25 to 1.88, p=0.46). In 2013, 2.6% of cigarette smokers reported having purchased one or more packs of cigarettes in non-compliant packaging in the past 3 months.

Scollo and colleagues<sup>37</sup> also carried out a larger, continuous national cross-sectional telephone survey from 6 months prior to implementation of standardized packaging (April 2012) until 15 months after implementation (March 2014). Respondents were current smokers (n=8678). Results showed there were no significant increases in purchase of 'illicit whites' (<0.1%; OR=0.24, 95% CI 0.04 to 1.56, p=0.134), international brands purchased for 20% or more below the recommended retail price (0.2%; OR=3.49, 95% CI 0.66 to 18.35, p=0.140)

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or packs purchased from informal sellers ( $<0.1\%$ ;  $OR=0.24$ ,  $95\% \text{ CI } 0.04 \text{ to } 1.47$ ,  $p=0.124$ ). The prevalence of any use of illicit tobacco remained at about  $3\%$  (adjusted  $OR=0.79$ ,  $95\% \text{ CI } 0.58 \text{ to } 1.08$ ,  $p=0.141$ ). The results of this large National study<sup>37</sup> confirmed those of the smaller State-based study<sup>36</sup>. Both found no increase in purchase of unbranded illicit tobacco and low levels of purchase of cigarettes likely to be contraband.

Finally, using the preferred methodology of the tobacco industry (empty-pack surveys), a third study<sup>21</sup> also reported no increases in illicit tobacco use in Sydney following the introduction of standardized packaging. Peters and Saffron<sup>21</sup> reported research based on two empty-pack surveys carried out 12 months apart in Sydney. In phase 1 of the study 1802 cigarette packs were collected,  $12.7\%$  (range  $0\text{--}33\%$  by local government area) of which did not comply with Australian legislation. In an extension phase of the study in which only non-conforming packs were collected, 727 were found. Of these, 500 were manufactured in or for South Korea and 66 in or for China. Only  $1.4\%$  of the cigarettes found were illicit or contraband. It was clear from this survey too that there was no increase in illicit tobacco use following the introduction of standardized packaging.

The State-based telephone survey<sup>36</sup> used both mobile and landline phones to survey smokers, which is likely to result in a more representative sample than using landlines alone. However, recent purchase of potentially illicit branded (contraband) tobacco was only assessed in the final year of the survey. As with other surveys, socially desirable responding and recall bias may have affected prevalence of illicit tobacco (as it is illegal), however this is likely to be the same over time. The survey was only conducted in one Australian State and with English speaking residents. The authors suggested that a larger National sample would be required to provide more robust data. However, the large National survey<sup>37</sup> still suffered from some of the same limitations as the earlier survey such as socially desirable responding, recall bias and exclusion of non-English speaking individuals. Also, because it is known that the prevalence of illicit tobacco purchasing behaviour increases with regularity of smoking, a sample which is restricted to individuals who smoke frequently will produce higher reported levels of this behaviour. Also when participants are surveyed regarding illegal behaviour, respondents may be unlikely to report this illegality or may be unsure as to whether their behaviour was illegal or not. This is despite ensuring anonymity and when consequences for the illegal behaviour are mild. Finally, the surveys were not able to reach heavy smoking subpopulations, such as the homeless or those in prison.

Limited information was provided on which to judge the quality of the empty-pack survey<sup>21</sup>. Regardless, empty-pack

surveys do allow researchers to use pack markings to identify purchase location and to determine the location of use based on where the pack was discarded. Unfortunately, empty-pack surveys suffer from lack of generalisation, as collection areas are often not in regions representative of the general population but limited to specific parts of a city. This may be further exacerbated by patterns of commuting and tourism. Other limitations of this method include problems identifying times of purchase and of consumption of the discarded packs as well as type of packs identified and packs purchased legally but discarded in the collection area.

### Retailing behaviour (intended)

Only one study examined retailers' perception of how the proposed introduction of standardized packaging would influence illicit trade<sup>39</sup>. Guthrie, Hoek, Darroch and Wood<sup>39</sup> reported a qualitative study employing in-depth interviews with 23 retailers of small convenience stores, small supermarkets, and service stations in two New Zealand cities (Wellington, a large city and Dunedin, a provincial city). Retailers were purposively sampled, from a previous study database, and stratified by store type and area deprivation level. Retailers reported concern about the implications of standardized packaging, financially and on their ability to provide a fast and efficient customer service. However, few retailers believed standardized packaging would promote illicit trade of tobacco products and even fewer had heard of a black market for tobacco or thought one likely. If a black market was to occur, retailers thought continued price increases would be more likely than standardized packaging to lead to illicit trade.

This was the first study<sup>39</sup> to examine New Zealand retailers' views of standardized packaging on the illicit tobacco trade using well-designed qualitative methods and collecting data until saturation. However, this was a comparatively small sample with many participants only speaking English as a second language and some who had sought support and advice from tobacco companies. Once again this study explored participants' views of standardized packaging rather than their actual experiences of the policy and socially desirable responding may have impacted on the responses from participants. While two members of the research team reviewed interview transcripts in order to provide some validation of findings, no methods were reported aimed at minimising bias.

### Retailing behaviour (actual)

Again, only one study explored how the introduction of standardized packaging legislation actually affected the retail of illicit tobacco. Scollo, Bayly and Wakefield<sup>38</sup> assessed the availability of illicit tobacco in small mixed business retail outlets



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before and after the introduction of standardized packaging in Australia. Retail outlets ( $n=303$ ) were visited at baseline (June and September 2012) and following implementation of the legislation (December 2012, February 2013, April 2013 and July 2013). The store sample was derived from sixteen postcode-based areas in each of Melbourne and Sydney, and eight in each of Adelaide and Perth. Areas were stratified by socio-economic status (SES) and randomly selected from each SES quartile. Secret shoppers requested a particular low cost brand of cigarette and then pushed for an even cheaper brand. The cheapest pack of cigarettes offered was purchased. In 179 (59%) of the shops the secret shopper then asked the retailer about the availability of unbranded, i.e. illicit tobacco. At baseline 13 (2.2%) of 598 packs were either non-compliant with Australian legislation and/or purchased for a suspiciously low price. Four packs (1.3%) of 297 met either or both criteria in the implementation month (December 2012) and five (0.6%) of 878 did so in the three assessment months following implementation. Illicit tobacco was offered on two (0.6%) of 338 occasions before implementation, one (0.6%) of 170 occasions in the implementation month and on three (0.6%) of 514 occasions after implementation.

This study<sup>38</sup> was likely to reflect the experience of ordinary customers attempting to locate illicit tobacco from everyday small mixed business tobacco retailers. However, the study did not include sales of illicit tobacco from informal sources such as friends/family and informal sellers/venues. Detailed methods reported that fieldworkers were well trained, rotated across stores and demographically similar to known users of illicit tobacco. Nevertheless, it is possible that the retail stores approached by the secret shoppers may have been more likely to sell illicit tobacco to known regular customers rather than to strangers and the study might have failed to approach retail outlets known by users to sell large amounts of illicit tobacco. This study also benefitted from a large sample, random selection of areas and a low rate of store loss from the sample.

### Tobacco industry behaviour

Finally, two studies<sup>34, 35</sup> examined the nature and quality of industry data on illicit tobacco and the potential effect of standardized packaging. Rowell and colleagues<sup>34</sup> quantified the volume, nature and quality of UK newspaper articles citing tobacco industry data on illicit tobacco between March 2008 and March 2013. They found that stories citing industry data on illicit tobacco started in June 2011, two months after the publication of the Tobacco Control Plan for England (including the proposal for standardized packaging). Most of the data reported were based on industry empty-pack surveys for which no methodology was available. Almost all industry data suggested an increase in illicit cigarettes that was not

supported by the independent data to which they were compared (HM Revenue & Customs figures and survey data from Pricing Policies and Control of Tobacco in Europe)<sup>34</sup>.

In addition, Evans-Reeves and colleagues<sup>35</sup> carried out a content analysis of the four TTCs submission to the consultation on standardized packaging for relevance and quality of evidence that TTCs cited to support their arguments that “it will harm business and increase illicit trade”. They found 74 pieces of TTC cited evidence; 45% opinion (from TTC connected third parties), 25% research, 15% strategy documents and 15% facts and figures, all of which were of poor quality. Sixty three pieces (85%) of the evidence related to the illicit trade but the authors did not report results separately for this and the economic evidence. However, there was no independent, peer-reviewed evidence that supported either of their arguments and 47% of the evidence was industry connected. Much (66%) of the industry connected evidence was opinion only and all industry connected evidence was of significantly poorer quality than independent evidence ( $p<0.001$ ).

Rowell et al.<sup>34</sup> were the first to analyse tobacco industry manipulation of data on the illicit cigarette trade, in the UK press, in response to the proposal for standardized packaging. Analysis of newspaper articles covered a 5-year period, although no other forms of media were considered. In addition the intent of the TTCs could not be measured and the independent data that were used for comparison of industry data were provided by one organisation only. Evans-Reeves and colleagues<sup>35</sup>, analysis of the four TTCs submission to the consultation on standardized packaging failed to report results separately for evidence relating to economic and illicit trade consequences and they were not able to identify industry connections to three of the organisations who co-authored with other TTC linked organisations. Evans-Reeves and colleagues<sup>35</sup> also did not assess the accuracy of the TTCs’ interpretation of the evidence reported and only counted unique pieces of evidence (although several were reported by more than one company and often by all four).

## DISCUSSION

This paper has systematically reviewed the evidence regarding the effect of standardized packaging on illicit tobacco use. There were few studies examining tobacco standardized packaging and illicit trade and those that were available were generally not of high quality. We identified ten relevant empirical studies which examined standardized packaging and illicit tobacco<sup>21, 30, 32-39</sup>. Five studies reported smokers did not intend to<sup>30, 32</sup> or actually<sup>21, 36, 37</sup> purchase more illicit tobacco following standardized packaging although one<sup>33</sup> suggested a small number of responders to online news felt smokers

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would be more inclined to purchase illicit tobacco, following standardized packaging. Two studies reported retailers did not intend to<sup>39</sup> or actually<sup>38</sup> increase sales of illicit tobacco following standardized packaging. Finally, two studies<sup>34, 35</sup> reported industry data on illicit tobacco was of poor quality and not supported by independent data. Therefore, there was no evidence to suggest that illicit tobacco use will increase after implementation of standardized tobacco packaging, which contradicts the arguments of the tobacco industry. A recent High Court ruling on standardized packaging<sup>41</sup> as well as a review by the Australian Government into its implementation of the measure<sup>42</sup> have exposed weaknesses in the tobacco industry's arguments.

Whilst this is the first study to systematically review the available evidence on the impact of standardized packaging on illicit tobacco, Sir Cyril Chantler in his independent review<sup>23</sup> of standardized packaging was also not convinced by the tobacco industry's argument that standardized packaging would increase the illicit market, especially in counterfeit cigarettes. He found no evidence that standardized packaging was easier to counterfeit and reported that, in Australia, hardly any counterfeit standardized packages had been found. Chantler also reported limitations to the quality of the evidence available as to the likely effect of standardized packaging on illicit tobacco consumption. Several of the studies in his review asked participants whether standardized packaging would change their smoking behaviour and intentions. Chantler called for caution in interpreting these findings as expressed smoking-related intentions are not always representative of future smoking behaviour.

It is clear that more research is needed in order to understand the effect of standardized packaging on illicit tobacco use. However, it is difficult to quantify any illegal activity as, by its very nature, actions are concealed. This is not only true of tobacco<sup>43</sup>, but also of other illegal markets<sup>44</sup>. However, an additional challenge for estimating the size of the illegal tobacco market (relative to strictly illegal products) is differentiating between products that originate from legal sources from the minority of products originating from illegal ones. There are three main methods that have been used to estimate the size of the illegal tobacco market; direct measurement, residual methods and expert opinion<sup>45</sup>.

Direct measurement estimates use empty-pack surveys, pack observation, return, and swap surveys and representative surveys of smokers' illicit purchasing behaviour to quantify a specific sector of the illegal market. Residual methods involve trade-gap analyses, comparisons of self-reported smoking and tax-paid sales, and econometric modelling. Multiple sources of data on legal and illegal markets are combined to determine the size of the illicit tobacco market. Expert opinion

methods involve canvassing the opinion of multiple experts to provide an estimate of the size of the illicit market. These research methods all vary in terms of size of sample, length of time studied, sources of error and scientific rigor, so it is not surprising that they produce different estimates of the size of the illicit market. As a result, researchers should use multiple methods to understand the effect of standardized packaging on illicit tobacco use<sup>45</sup>.

Further, in order to fully understand the actual effect of standardized packaging on illicit tobacco use, data would need to be collected using multiple methods both before and after a considerable period of time following implementation of the strategy. Ideally studies from more than one country would be needed in order to reveal associations. Although there is limited early evidence regarding actual illicit tobacco purchasing behaviour following implementation of standardized packaging legislation in Australia those studies that have examined this phenomenon have all concluded that there has been no increase in the purchase of illicit tobacco<sup>21, 36, 37</sup>.

The UK became the second country in the world and the first in Europe to require cigarettes to be sold in standardized packaging. On 11 March 2015 a clear majority of MPs voted in favour of the regulations. The regulations were approved by the House of Lords on 16th March and took effect in May 2016<sup>46</sup>. France and Ireland are following suit. This systematic review has shown that, while there are few high quality studies examining the effect of tobacco standardized packaging on the illicit trade, those that are available report no evidence that standardized tobacco packaging will lead to an increase in the illicit tobacco trade, either for the reasons put forward by the TTCs or for any other reason. Governments particularly in Australia, New Zealand and the UK, have no reason to fear a flood of illicit sales as they progress standardized packaging legislation.

### Strengths and Limitations

One of this review's limitations is that it considers a public health intervention, standardized tobacco packaging, that is in its early stages in only three countries and about which the first evaluations are only beginning to emerge. The majority of data on the illicit tobacco trade appears to have been collected outside of the peer review domain and as such are not available for review. Therefore, only ten peer-reviewed published studies were identified and these were of relatively weak study design and most were not of high quality. The lack of homogeneity between studies also resulted in a narrative synthesis of results rather than being able to combine data in a meta-analysis. The optimum time to assess the veracity of the tobacco industry's main argument that standardized packaging will lead to an increase in illicit tobacco would be after a

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considerable period of time following implementation, and ideally would include studies from more than one country in order to reveal associations. However, this review was carried out at an important time of policy development in the UK and is important to provide timely refutes to arguments that are not built upon evidence and are designed to oppose effective public health interventions.

## CONCLUSIONS

This paper has systematically reviewed the evidence regarding the effect of standardized packaging on illicit tobacco use. There were few studies examining tobacco standardized packaging and illicit trade, and those that were available were generally not of high quality. However, there was no evidence to suggest that illicit tobacco use will increase after implementation of standardized tobacco packaging, which contradicts the arguments of the tobacco industry.

## REFERENCES

1. World Health Organisation. WHO Report on the Global Tobacco Epidemic. 2013. Geneva, Switzerland, World Health Organisation.
2. Giovino GA, Mirza SA, Samet JM, Gupta PC, Jarvis MJ, Bhala N, Peto R, Zatonski W, Hsia J, Morton J, Palipudi KM. Tobacco use in 3 billion individuals from 16 countries: an analysis of nationally representative cross-sectional household surveys. *The Lancet*. 2012;380(9842):668-79. doi: 10.1016/S0140-6736(12)61085-X
3. Department of Health. Healthy Lives, Healthy People: A Tobacco Control Plan for England. 2011. London, England, Department of Health.
4. World Health Organisation. WHO Framework Convention on Tobacco Control. 2003. Geneva, Switzerland, World Health Organisation.
5. World Health Organisation. Guidelines for implementation of Article 11 of the WHO Framework Convention on Tobacco Control (Packaging and labelling of tobacco products). 2008. Available at: [http://www.who.int/fctc/guidelines/article\\_11.pdf](http://www.who.int/fctc/guidelines/article_11.pdf) (accessed 25 September 2012).
6. Moodie C, Hastings G. Tobacco packaging as promotion. *Tobacco Control*. 2010;19(2):168-70. doi: 10.1136/tc.2009.033449
7. Wakefield M, Morley C, Horan JK, Cummings KM. The cigarette pack as image: new evidence from tobacco industry documents. *Tobacco Control*. 2002;11(suppl 1):i73-80. doi: 10.1136/tc.11.suppl\_1.i73
8. Pilditch, J. *The Silent Salesman: How to Develop Packaging That Sells*. 1961. London, England, Harper and Row.
9. Eindhoven, G. Elegant packs promote image, defend property rights. 1999. *World Tobacco*, 170, 16-18.
10. Moodie, C., Stead, M., Bauld, L., et al. Plain Tobacco Packaging: A Systematic Review. 2012. Stirling, Scotland, Centre for Tobacco Control Research: University of Stirling.
11. Tobacco Plain Packaging Regulations. Tobacco Plain Packaging Regulations 2011.
12. Department of Health. Consultation on standardised packaging of tobacco products. 2012. London, England, Department of Health.
13. Philip Morris International. Standardised tobacco packaging will harm public health and cost UK tax payers billions: A response to the Department of Health consultation on standardised packaging of tobacco products. 2012. Richmond, England, Philip Morris International.
14. Japan Tobacco International. Response to the Department of Health's Consultation on the Standardised Packaging of Tobacco Products. 2012. London, England, Japan Tobacco International
15. Imperial Tobacco. Bad for business; bad for consumers; good for criminals. 2012. London, England, Imperial Tobacco.
16. British American Tobacco. UK Standardised Packaging Consultation: Response of British American Tobacco UK Limited. 2012. London, England, British American Tobacco.
17. Gilmore, A.B., Branston, J.R. and Sweanor, D. The case for OFSMOKE: how tobacco price regulation is needed to promote the health of markets, government revenue and the public. *Tobacco Control*. 2010, 19(5), pp.423-430. doi: 10.1136/tc.2009.034470
18. HM Revenue & Customs. Tackling Tobacco Smuggling - building on our success. 2011. London, England, HMRC
19. HM Revenue & Customs 2015. Measuring tax gaps 2015 Edition: Tax gap estimates for 2013-14. London, England, HMRC.
20. Gilmore A.B., Rowell A., Gallus S., et al. Towards a greater understanding of the illicit tobacco trade in Europe: a review of the PMI funded 'Project Star' report. *Tobacco Control*, 2013; 0: 1-11 doi: 10.1136/tobaccocontrol-2013-051240
21. Peters, M., Saffron, M. Patterns of non-compliant tobacco use in Sydney estimated using an empty cigarette pack survey. 2015. *Respirology* 20(2), 60.
22. Moodie, C., Angus, K., Stead, M. et al. Plain Tobacco Packaging Research: An Update. 2013. Stirling, Scotland, Centre for Tobacco Control Research: University of Stirling.
23. Chantler, C. Standardised packaging of tobacco. Report of the independent review. 2014. London, England, Kings College London.
24. Hughes N, Arora M, Grills N. Perceptions and impact of plain packaging of tobacco products in low and middle income countries, middle to upper income countries and low-income settings in high-income countries: a systematic review of the literature. *BMJ open*. 2016 Mar 1;6(3):e010391. doi: 10.1136/bmjopen-2015-010391
25. Stead M, Moodie C, Angus K, Bauld L, McNeill A, Thomas J, Hastings G, Hinds K, O'Mara-Eves A, Kwan I, Purves RI. Is consumer response to plain/standardised tobacco packaging consistent with framework convention on tobacco control guidelines? A systematic review of quantitative studies. *PloS one*. 2013 Oct 16;8(10):e75919. doi: 10.1371/journal.pone.0075919
26. Hammond, D. Standardized packaging tobacco products evidence review: prepared on behalf of the Irish Department of Health. 2014. University of Waterloo, Waterloo, ON Canada
27. Beede P, Lawson R. The effect of plain packages on the perception of cigarette health warnings. *Public health*. 1992;106(4):315-22.
28. Moher, D., Liberati, A., Tetzlaff, J. et al. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA statement. 2009. *PLoS Med*, 6(6).



## Review paper

29. Effective Practice and Organisation of Care (EPOC). Data collection form. EPOC resources for review authors. Oslo: Norwegian Knowledge Centre for Health Services; 2013. Available at: <http://epoc.cochrane.org/epoc-specific-resources-review-authors>. (accessed 07/12/16)
30. Moodie, C., Hastings, G., Joossens, L. Young adult smokers' perceptions of illicit tobacco and the possible impact of plain packaging on purchase behaviour. 2012. *European Journal of Public Health*, 22, 251-253. doi: 10.1093/eurpub/ckr038
31. CASP. Critical Appraisal Skills Programme. 2013. Available at: <http://www.caspinternational.org/?o=1012>. (accessed 22/04/16)
32. Moodie, C., Purves, R., Mckell, J. et al. Young women smokers' perceptions and use of counterfeit cigarettes: Would plain packaging make a difference? 2014. *Addiction Research and Theory*, 22(3), 263-270.
33. Freeman, B. Tobacco plain packaging legislation: a content analysis of commentary posted on Australian online news. 2011. *Tobacco Control*, 20, 361-6. doi: 10.1136/tc.2011.042986
34. Rowell, A., Evans-Reeves, K., Gilmore, A.B. Tobacco industry manipulation of data on and press coverage of the illicit tobacco trade in the UK. 2014. *Tobacco Control*, 23, e35-e43. doi:10.1136/tobaccocontrol-2013-051397
35. Evans-Reeves, K.A., Hatchard, J.L., Gilmore, A.B. 'It will harm business and increase illicit trade': an evaluation of the relevance, quality and transparency of evidence submitted by transnational tobacco companies to the UK consultation on standardised packaging 2012. 2015. doi: 10.1136/tobaccocontrol-2014-051930 *Tobacco Control*, 24, e168-e177.
36. Scollo, M., Zacher, M., Durkin, S. et al. Early evidence about the predicted unintended consequences of standardised packaging of tobacco products in Australia: a cross-sectional study of the place of purchase, regular brands and use of illicit tobacco. 2014. *BMJ Open*, 4, e005873. doi: 10.1136/bmjopen-2014-005873
37. Scollo, M., Zacher, M., Coomber, K. et al. Use of illicit tobacco following introduction of standardised packaging of tobacco products in Australia: results from a national cross-sectional survey. 2015. *Tobacco Control*, 24, ii76-ii81.
38. Scollo, M., Bayly, M., Wakefield, M. Availability of illicit tobacco in small retail outlets before and after the implementation of Australian plain packaging legislation. 2015. *Tobacco Control*, 24, e45-e51. doi: 10.1136/tobaccocontrol-2013-051353
39. Guthrie, J., Hoek, J., Darroch, E., Wood, Z. A qualitative analysis of New Zealand retailers' responses to standardised packaging legislation and tobacco industry opposition. 2015. *BMJ Open*; 5:e009521 doi: 10.1136/bmjopen-2015-009521
40. Chmiel A, Sienkiewicz J, Paltoglou G. et al. Negative Emotions Accelerating Users Activity in BBC Forum. Cornell University Library E-Prints. 2010. Available at: <http://arxiv.org/abs/1011.5459v1>. (accessed 15/12/16)
41. BAT v Department of Health 2016 EWHC 1169
42. Australian Government Department of Health. Post-Implementation Review: Tobacco Plain Packaging: 2016. Office of Best Practice Regulations
43. Joossens L, Merriman D, Ross H, Raw M. The impact of eliminating the global illicit cigarette trade on health and revenue. *Addiction*. 2010; 105(9): 1640-9 doi: 10.1111/j.1360-0443.2010.03018.x
44. Bouchard M, Tremblay P. Risks of arrest across drug markets: A capture-recapture analysis of "hidden" dealer and user populations. *Journal of Drug Issues*. 2005; 35(4): 733-54
45. Reuter P, Majmundar M. Understanding the U.S. Illicit Tobacco Market: Characteristics, Policy Context, and Lessons from International Experiences. 2015. Chapter: 4 Measuring the Size of the Illicit Tobacco Market. The National Academies Press, Washington.
46. Canadian Cancer Society. Plain Packaging – An International Overview A summary of developments around the world. 2015. Available at: [http://www.ash.org.uk/files/documents/ASH\\_960.pdf](http://www.ash.org.uk/files/documents/ASH_960.pdf) (accessed 22/04/16)

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**CONFLICT OF INTERESTS**

Two of the authors (CMT, AR) work for Fresh Smoke Free North East. The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

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**PROVENANCE AND PEER REVIEW**

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